

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference yjpc002	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/KR2004/001842	International filing date(day/month/year) 23 JULY 2004 (23.07.2004)	Priority date (day/month/year) 24 JULY 2003 (24.07.2003)	
International Patent Classification (IPC) or national classification and IPC IPC7 F16B 1/00			
Applicant LEE, Geum-Suk			

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 7 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).
- This report contains indications relating to the following items:
 - ☒ Box No. I Basis of the report
 - ☐ Box No. II Priority
 - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Box No. IV Lack of unity of invention
 - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Box No. VI Certain documents cited
 - ☒ Box No. VII Certain defects in the international application
 - ☒ Box No. VIII Certain observations on the international application

Date of submission of the demand 24 MAY 2005 (24.05.2005)	Date of completion of this report 11 NOVEMBER 2005 (11.11.2005)
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Box No. 1 Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ the international application as originally filed/furnished

- ☐ the description:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____

- ☐ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____

- ☐ the drawings:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____

- ☐ the sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1 - 6	YES
	Claims		NO
Inventive step (IS)	Claims	4, 6	YES
	Claims	1 - 3, 5	NO
Industrial applicability (IA)	Claims	1 - 6	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

1. Prior art

Reference is made to the following documents:

D1: JP 14-162211 A (MITSUBISHI HEAVY IND. LTD.) 7 Jun. 2002

D2: JP 11-173820 A (FURUKAWA ELECTRIC CO., LTD.) 2 Jul. 1999

2. Regarding Novelty

The subject matter of claim 1 of the present application is a fixer for a fiber bragg grating sensor comprising a pair of fixing pieces (3) equipped with a sensor holding groove (3b) and a tube receiving portion (3a), a tube enclosing the fiber bragg grating sensor (S), and a fastening member (4). The fixer of claim 1 is characterized in that the optical fiber bragg grating sensor is inserted into the tube, that both ends of the tube are secured to the tube receiving portions. and that both ends of the fiber bragg grating sensor are secured to the sensor holding groove.

The subject matter of D1 is a strain measuring device and its installing method, the strain measuring device comprising a pair of supporters (13), a tube (10) and a fastening member (25).

Both D1 and claim 1 include a tube and a fastening member. Furthermore, the tube (10) of D1 includes a fiber bragg grating sensor (21) as disclosed in claim 1, and the fastening member (25) of D1 secures the tube (10) to a pair of supporters (13) as disclosed in claim 1 as well. The pair of supporters (13) of D1 play the same role as the pair of fixing pieces of claim 1. As for the fixing pieces of claim 1, they further include a sensor holding groove and a tube receiving portion as described above. The tube receiving portion of claim 1 corresponds to the welded section (14) of D1.

Since D1 does not have a separate sensor holding groove, which claim 1 has, the subject matter of claim 1 is considered to differ from that of D1.

(Continued in the supplemental box.)

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Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

1. Rule 6.2(b) PCT requires that reference signs in the claims should preferably be placed between parentheses. It is considered that this rule has not been satisfied.
2. Rule 5.1(a)(ii) PCT requires that the description shall indicate the background art which, as far as known to the applicant, can be regarded as useful for the understanding, searching, and examination of the invention, and preferably, cite the documents reflecting such art. It is considered that this rule has not been satisfied.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. The reference signs in the description shall preferably be placed between parentheses.
2. The following words do not follow the rules for dividing words at the end of the line, i.e., dividing words only between syllables using a hyphen: 1. "sens/or" in paragraph 1; 2. "refere/nce" in paragraph 30; 3. "fi/xed" in paragraph 31.

3. Grammatical errors are found in the following phrases:

paragraph 1: by which . . . fixer
in which . . . protects the FBG sensor
paragraph 5: set a value . . . in space-time
paragraph 9: by which . . . fixed and protected
paragraph 10: the fixer including . . . adhered to the object
in which . . . of the tube
paragraph 16: examples . . . drawings
paragraph 17: in which . . . from the exterior
paragraph 32: prevent to wrongly measure

4. Typographic errors are found in the following paragraphs:

paragraph 4: 125 mm
paragraph 10: pipe
paragraph 17: pipe
paragraph 20: ms

5. The "initial value in the paragraph 1 and "set a value" in paragraph 5 do not seem to be proper expressions. It seems that "a tube for connecting" is a proper expression for "a tube for spacing" in paragraph 17 and "with distance" for "at a regular intervals" in the same paragraph. Also "inspect civil constructions" seems to be a proper expression for "measure the civil constructions" in paragraph 32.

6. According to paragraph 26, the present invention includes the step of unfastening the bolt of the tube receiving portion. The technical reason for unfastening the bolt should be given.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Box V.

The subject matter of D2 is a strain sensor and its manufacturing method. Since D2 does not include fixing pieces and a tube for optical fiber, the subject matter of claim 1 is also considered to differ from that of D2.

Therefore, the subject matter of claim 1 is considered to be new (Art. 33(2) PCT).

The subject matter of claims 2-6 dependent on claim 1 is also considered to be new (Art. 33(2) PCT).

3. Regarding Inventive Step

3.1 The closest prior art is considered to be D1. As already pointed out, the difference between D1 and claim 1 lies in that D1 does not include a separate sensor holding groove. The role of the sensor holding groove is to sustain a certain degree of tension on a sensor by securing the sensor to the sensor holding groove using an adhesive. Even though D1 does not include a sensor holding groove, D1 also secures the sensor to the pair of supporters using the method of welding (see paragraph 24) for the same purpose as claim 1.

Moreover, D2, which belongs to the same technical field as D1 and the present application, uses an adhesive to secure a sensor in order to sustain a certain degree of tension (see abstract and Figure 1). It can be seen that using an adhesive for securing an optical sensor is already known before the priority date of the present application.

From the reasoning mentioned above, it is considered that the purpose of securing a sensor is satisfied in D1 and furthermore it seems obvious to the person skilled in the art to apply the technique of D2 to D1 in order to achieve the present invention.

Therefore, the subject matter of claim 1 is not considered to involve an inventive step (Art. 33(3) PCT).

3.2 The subject matter of claim 2 is to further include a cover for closing the sensor holding groove. Since including a cover is so obvious from the prior art, the subject matter of claim 2 is not considered to involve an inventive step (Art. 33(3) PCT).

(Continued on the next page.)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Previous page.

3.3 The subject matter of claim 3 is to further limit the fixing means to have a protruded tube receiving portion and to include a threaded hole and a fastening bolt. From Figures 3 and 4 of D1, it can be easily seen that D1 also includes an equivalent to the protruded tube receiving portion. Even though the protruded tube receiving portion of D1 is for a sensor, not for a tube, it is considered that D1 can achieve the same effect as claim 3 because the tube covers the protruded sensor receiving portion. Also, Figures 3 and 4 show that D1 uses a threaded hole and a fastening bolt for securing the equivalent to the tube (see the reference sign 14 of D1).

Therefore, the subject matter of claim 3 is not considered to involve an inventive step (Art. 33(3) PCT).

3.4 The subject matter of claim 5 is to further limit the fixer to be attached to the object. Since D1 attaches both tube and supporters (which correspond to the fixer of the present invention) to the object (see paragraph 23 and 26), the feature of claim 5 is already disclosed in D1.

Therefore, the subject matter of claim 5 is not considered to involve an inventive step (Art. 33(3) PCT).

3.5 The subject matter of claims 4 and 6 is to further include an anti-slip groove and to limit the tube to be inserted into the tube receiving portion using a tap, respectively. Using an anti-slip groove in the field of fixing an optical fiber is not disclosed in any of the documents cited in the International Search Report, nor does it seem obvious to include such a feature in this technical field.

Since the diameter of the tube of D1 is almost the same as that of the pair of supporters, it is not possible to have the construction of inserting the tube into the pair of supporters. Consequently, it is considered that the feature of claim 6 cannot be deduced from the structure of D1. Furthermore, none of the documents cited in the International Search Report teach or suggest such a feature.

Therefore, the subject matter of claims 4 and 6 seems to involve an inventive step (Art. 33(3) PCT).

4, Industrial Applicability

The subject matter of claims 1 to 6 is considered to be industrially applicable (Art. 33(4) PCT).